WPS3707

Multilateral Trade Liberalization and Mexican Households:

The Effect of the Doha Development Agenda

by

Alessandro Nicita*

Chapter 4 in *Poverty and the WTO: Impacts of the Doha Development Agenda*, Thomas W. Hertel and L. Alan Winters (eds) forthcoming from the World Bank, Washington, D.C.

World Bank Policy Research Working Paper 3707, September 2005

The author wishes to thank Thomas Hertel, Marcelo Olarreaga and George Rapsomanikis and participants of the trade and poverty conference in The Hague (December 2-4, 2004) for helpful comments and discussions. I am indebted to Maros Ivanic for estimating and providing the GTAP results.

*Development Research Group, Trade (DECRG-TR), World Bank, 1818 H Street, NW, Washington D.C. 20433, email:anicita@worldbank.org

Abstract

Empirical evidence suggests that global trade reforms are unlikely to produce analogous results across countries, especially when analyzing their effect on poverty. This implies that the analysis of trade reform on social welfare cannot be generalized and needs to be conducted on a country by country basis. Moreover, even within the same country, geographic areas, households, and individuals are likely to be differentially affected, some of them benefiting more than others, while others might lose. With this in mind, this paper provides a quantitative estimate of the effect on Mexican households from the implementation of the Doha development agenda. The analysis utilizes a two-step approach for which changes in prices and factors are estimated through a CGE model (GTAP) and then mapped into the welfare function of the household using household survey data. The empirical approach used in this study aims to measure the impact of Doha implementation by tracing changes in the household prices of goods and factors and their impact on household welfare, taking particular account the role of domestic price transmission.

The findings suggest that multilateral trade liberalization alone would have a negative effect on Mexican households, even though very small. However, when the implementation of the Doha development agenda is complemented by domestic policies aimed to increase productivity and improve domestic price transmission, the overall effects become positive. The results point to the importance of domestic price transmission in determining the variance of the effects across households.

Introduction

Trade negotiations have recently occupied center stage in multilateral policy discussions. The belief is that international trade, and the reduction of protectionist barriers as a means of increasing it, is a powerful tool to spur economic growth and reduce poverty in developing countries. However, the evidence of the positive effects of international trade reform on poverty in developing countries is fragmentary[1]. In practice, the consensus is that trade policies are only one ingredient in the development recipe and other policies are generally needed in order to ensure that trade will enhance welfare for the majority of the poor. Therefore, it is important to investigate the factors that influence the relationship between trade reform and poverty alleviation. This paper focuses specifically on the role of the marketing system in transmitting price changes from the border to rural and urban households throughout Mexico.

Empirical evidence suggests that similar trade reforms are unlikely to produce analogous results across countries, especially when analyzing their effect on poverty. This implies that the analysis of trade reform on social welfare cannot be generalized and needs to be conducted on a country by country basis. Moreover, even within the same country, geographic areas, households, and individuals are likely to be differentially affected, some of them benefiting more than others, while others might lose. Therefore, it is necessary to analyze the impact of trade policies on poverty utilizing a micro economic framework so as to identify likely winners and possible losers. In particular, the analysis of the distribution of benefits and costs across regions, communities and individuals is important when thinking about complementary and compensatory policies.

[1] A review of the findings of the literature is given by Winters et al. (2004), Hertel and Reimer (2004) and Berg, and Kruger (2003).

This paper provides a quantitative estimate of the effect on Mexican households from the implementation of the Doha development agenda. The analysis utilizes a variant of the two-step approach. However, in this case a national CGE model is not employed. Instead, the changes in prices and factors estimated through the GTAP global CGE model are transformed based on the econometrically estimated price transmission relations and then mapped directly into the welfare function of the household.[2] The contribution of this paper rests in the translation of the national price changes to the local level.

In analyzing the poverty effect of multilateral trade liberalization, the paper takes into account the changes in factor returns (labor and land) and the cost of the consumption basket and value of income sources of poor households so as to measure changes in real income and poverty. This study is enriched by the analysis of domestic price transmission so as to investigate the magnitude of the effect of trade policies at the local level. Simply put, the paper measures the effect of trade policies on poverty not only on the basis of what the poor produce and consume, but also taking into account the geographical location where this production and consumption takes place.

To summarize the main results, the findings suggest that multilateral trade liberalization alone would have a negative effect on Mexican households, albeit a very small one. However, when the implementation of the Doha development agenda is complemented by domestic policies aimed to increase productivity and improve domestic price transmission the overall effect becomes positive. The results point to the importance of domestic price transmission in determining the variation in impacts across households.

[2] The economics involved in this approach is generally well known and has found numerous applications. See Hertel and Reimer (2004) for a review.

Given the existing structure of markets in Mexico, the results indicate that the effects of multilateral trade liberalization would concentrate in the northern states, which are more closely connected to international markets. Conversely, households living in the southern states are largely insulated from these effects, not because of the composition of their consumption or income bundle, but rather because of the very limited effect of trade reforms on prices in those areas.

The remainder of this paper is organized as follows. Section 1 describes the extent and distribution of poverty in Mexico. Section 2 analyzes the Doha implications for Mexican households. Section 3 illustrates the empirical framework. Section 4 presents the results. Section 5 concludes. The annex discusses the household data base as well as its reconciliation with, and mapping to, the macro data (GTAP).

1. Poverty in Mexico

Despite Mexico's status as a middle-income country and a member of the OECD, poverty in Mexico is widespread. Poverty levels have moved substantially during the 1990s decreasing in periods of economic growth and increasing in economic downturns. Extreme poverty[3] was estimated to be about 24 percent in the early 1990s. Economic reforms and growth produced a reduction of about 3 percentage points by 1994. The economic crisis of 1995 and the sharp devaluation of the peso then led to a sharp increase in poverty (to 37 percent in 1996 and 34 percent in 1998). Finally, economic recovery in the late 1990s produced the largest decline in poverty, with extreme poverty falling to pre-crisis levels in 2000 and declining thereafter to about 20 percent in 2002. The

[3] This corresponds to the food poverty line. The food poverty line is defined as the minimum expenditure necessary to guarantee a 2200 calories intake per day.

incidence of poverty in Mexico varies widely by region. Table 1 illustrates the incidence of poverty in five Mexican regions for the year 2000.[4]

Poverty in Mexico is fundamentally a rural phenomenon. More than half of the households living in rural areas are extremely poor. With the exception of the Federal District of Mexico City, northern states are the ones that register the lowest incidence of poverty. The states in the central regions and especially the southernmost states register the highest percentage of poor. While extreme poverty rates are relatively low, especially in urban areas, moderate poverty is more widespread. At the national level more than 50 percent of the population is moderately poor with peaks of about 90 percent in rural areas in the central and southern states. Given these premises, it appears that in order to have the greatest effect on poverty, trade policies need to reach the rural poor in the central and southern regions.

2. Exposure of the poor to International Price Shocks

The extent to which international trade policies will result in a decrease in poverty in Mexico depends in particular upon the exposure of poor Mexican households to trade shocks. The easiest way to think about how poor rural households are affected by trade policies is in terms of the "farm household", which produces goods and services, sells its labor and consumes goods and services. In this setup, an increase in the price of something of which the household is a net seller increases its real income, while a decrease reduces it.

[4] The extreme poverty line corresponds to the food poverty line. The moderate poverty line is the asset poverty line. The difference corresponds to non-food components in the consumption bundle. Both poverty lines are calculated by CEPAL (2001).

Figure 1 summarizes the income sources of Mexican households. Households are categorized by very poor (those below the extreme poverty line), poor (those below the poverty line but above the extreme poverty line) and non-poor. This figure points to the importance of labor earnings for Mexican households. Labor earnings represent about 50 percent of income for poor households and slightly less than 40 percent for very poor households. Moreover, the very poor are tied to the performance of the agricultural sector as more than half of their income is related to agriculture (own-consumption plus agricultural sales and agricultural wages).[5]

Figures 2a and 2b presents the composition of the expenditure basket of Mexican households. The consumption basket of very poor households is roughly equally divided between own-consumption, food purchases, and purchases of non-food goods and services. A similar consumption basket is found in the case of poor households which exchange a lower share in auto-consumption with a higher share of other expenses (especially services). Among food purchases (Figure 2b), cereals (mainly maize) take about one-fourth of expenditures. Other vegetables take about 20 percent of purchases, while animal based products account for about 30 percent. Poor households tend to purchase more animal based products and fewer cereals and vegetables relative to very poor households.

In summary, the analysis of income sources and expenditure baskets of poor households reveals that: a) Mexican households rely greatly on labor earnings; b) the income of very poor households is strongly related to the agricultural sectors; c) there is a

[5] Other sources of income also include government transfers (about 4 percent of total income) and remittance (about 3 percent of total income). Given their low weight on the overall income source of poor households, income from these categories is assumed fixed and therefore not affected by trade policies.

net distinction in the labor earnings of different household groups, with non poor relying mostly on skilled labor income and the poor relying mostly on unskilled labor earnings; d) on the consumption side, poor households spend most of their income on food purchases, and among those most is spent on cereal (maize) and animal based products (meat, dairy). Given these premises, the effect on poverty of the Doha development agenda will depend mostly upon its effect on the prices of some key products (namely cereals and meats) and on labor earnings. The next section analyzes the impact of a successful Doha implementation on prices and factors important for poor households in Mexico

2.1 Doha implications for Mexico

In this paper the implications of the Doha development agenda on Mexican households and poverty reduction are estimated analyzing four factors[6]:

a) Impact on prices of goods produced and consumed by Mexican households.

b) Impact on the demand for Mexican exports.

c) Impact on labor and land earnings in Mexico.

d) Extent to which those effects are transmitted to each household.

The change in average prices, the return to labor and export supply for the average Mexican household (items *a*, *b* and *c*) are estimated through the GTAP model and are discussed below. Price transmission (item *d*) is discussed in section 4.

[6] The GTAP model was estimated keeping the impact of trade reforms on government revenues neutral (e.g. compensated by internal taxation). We also assume that transfer payments are indexed such that they do not play a role in the welfare calculation.

The change in prices and quantities and returns to labor and land consequent to trade reforms are obtained from the GTAP model. The GTAP results employed here are generated by trade reform simulations that *include* Mexican cuts in tariffs and domestic support. This is because we do not introduce a national CGE model. Two scenarios are considered: full trade liberalization (Full-Lib) scenario which assumes full tariff removal, removal of all export subsidies and domestic support, and the core Doha scenario.

Table 2 reports the change in prices and factor returns as estimated for the Mexican economy by the GTAP model for the both of these scenarios.[7] From these results, it is clear at the Doha development agenda is expected to produce only small changes in the prices of goods and factor returns in Mexico.[8] The largest effect for the Doha scenario is estimated in the return to natural resources which is expected to increase about by 1.6 percent in real terms. The return to land is expected to increase by 1 percent and wages (both skilled and unskilled) are expected to decrease minimally. Prices, with the exception of oils and fats are expected to rise by between 0 and 1 percent. More generally, prices are expected to rise only for agricultural products and not for manufacturing.

Larger effects are estimated for the full trade liberalization scenario. In this scenario, return to land is expected to substantially decrease (by about 16 percent), as domestic support for Mexican agriculture is fully removed. Labor earnings are expected to decline by about 0.1 percent (unskilled) and increase by 0.1 percent (skilled). More interesting are the effects on prices. The price of cereals is expected to rise by almost 15

[7] Within the model, the impact of tariff changes on government revenues and redistribution is kept neutral adjusting prices by the effect of compensating changes in direct income taxation.
[8] One of the reason of the small changes is to be found in the fact that trade is already largely free within the NAFTA countries.

percent, oils and fats by another 15 percent, the price of dairy product is expected to decline by about 0.6 percent, while little or no effect is found in the price of meat products and sugar. Finally, prices for vegetables and other agricultural products are expected to decline by nearly 2 percent. Smaller changes are estimated for the prices of manufactures which change between –0.6 percent (household items) and +0.3 percent (food products).

In addition to the change in prices, the trade reforms are estimated to result in a change in production. In the case of the Doha scenario, Mexico's aggregate production is estimated to increase by about 850 million USD. Those increases are mostly concentrated in manufacturing and services. In the case of full trade liberalization production (and especially exports) is expected to decrease substantially. This is driven by the erosion of Mexico's preferential access to the US market.

Having identified the changes in the prices and demand for Mexican products as well as the return to factors for Mexico, the following section illustrates the empirical strategy used to measure how those effects translate into household welfare and ultimately on poverty.

3. Empirical Framework

The approach utilized here to estimate the effect of trade liberalization on household welfare can be summarized in three steps. First, the effects of the Doha implementation estimated by the GTAP model are translated into local prices (and quantities) using a pass-through model that allows the transmission from border prices to domestic prices to vary by local markets. Second, the changes in the prices of goods at

the local level are utilized to investigate the movement in earnings and quantities supplied. As a last step, those changes are mapped to the household survey and fed into the household welfare function using a farm household model so as to measure the changes in real income.

3.1 International prices and domestic prices

The successful Doha implementation would have an effect, albeit small, on the prices of various products important both in the consumption baskets and the income sources of Mexican households. However, it is widely recognized that the international prices of products and their retail prices are only loosely linked, as internal factors such as transportation costs and local supply of substitute products act as filters between the two (Frankel et al, 2004 and Winters et al, 2004). The isolation of local markets is particularly true in rural areas where marketing infrastructure is poorly developed or altogether missing

Given the fact that domestic price transmission is imperfect, to measure poverty effects of trade reforms, it is necessary first to estimate the magnitude of changes in local retail prices consequent to changes in world prices. In other words, movement in average prices consequential to trade policies (those estimated by the CGE model) need to be translated in changes in retail prices (those faced by the households). The model utilized here to measure the extent to which local prices vary relative to the international prices follows the approach of Nicita (2004) and is based on the tariff and exchange rate pass-through literature (Goldberg and Knetter, 1997 and Campa and Goldberg, 2002).

In the pass-through estimation, all product groups are aggregated into two main categories: agriculture and manufacturing. Within these two broad categories, all products are assumed to have the same domestic price pass-through coefficient. This model allows changes in prices to be different across the 32 Mexican states, which are further differentiated by urban and rural areas. To assure compatibility with the CGE estimates, the changes in regional prices consequent to movement in the international prices are rescaled, while still keeping the change faced by the average household equal to the one estimated by the GTAP model.[9]

The model utilized to estimate domestic price pass-through is based on the effect of tariff liberalization on domestic prices as they vary with distance from the US border. In this model, the effect of a change in tariff is perceived in local markets in the same way as a movement in the world price, therefore the extent to which domestic prices move in function of movement of the tariff can be interpreted as the degree of correlation between border prices and retail prices. In summary, the model tracks the effect of a change in price at the U.S. border (produced by the change in tariff) to changes in the price at the regional level so as to capture how much of the movement in the border prices is reflected in each of the retail prices in different geographic areas.[10] To capture differences in pass-through across states, the pass-through coefficient is interacted with the distance variable.[11] Moreover, this interaction term is further interacted with a rural and an urban dummy so as to investigate possible differences in pass-through between

[9] The GTAP Armington specification produces average market prices already adjusted for imperfect price pass-through.

[10] Prices are corrected for quality issues following the standard methodology by Prais and Houthakker (1955).

[11] The variable used in the model to capture differences in the movement in the retail prices is the driving distance from the US border. Distance is measured in 1000 km.

urban and rural areas.[12] Referring to Nicita (2004) for a detailed explanation of the model, the estimating equation is given by:

$$\ln P_{rgt} = \beta_0 + \beta_1 \ln X_{gt} + \beta_2 \ln Z_{gtr} + \beta_3 d_r + \\ + \gamma \ln(1+\tau_{tg}) + \gamma_1 \ln(1+\tau_{tg}) d_r U + \gamma_2 \ln(1+\tau_{tg}) d_r R + \varepsilon_{rgt} \quad (1)$$

where X_{gt} is the primary control variable (the international price of good *g* expressed in domestic currency), while Z_{gtr} is a vector of control variables that includes local supply and regional income, *R* and *U* denote rural and urban dummy, and ε_{gtr} is an i.i.d. error term. The coefficients of interest are: γ that represents the tariff pass-through elasticity and γ_1 and γ_2 that are its adjustment for distance from the US border. The pass-through is "full" or "complete" if $\gamma = 1$ and the pass-through is "incomplete" if $\gamma < 1$. Similarly, the effect of the pass-through will be identical in all urban areas if $\gamma_1 = 0$. On the other hand, if local prices vary as a consequence of movement in the tariff, then $\gamma_1 \neq 0$. Similar reasoning is applied in the case of rural areas, where the coefficient of interest is γ_2.

The econometric estimation of equation (1) combines a time series of cross-sectional data set into a pseudo panel.[13] The data consist of domestic prices for 63 regions and six time periods. Average prices for each region are arranged into a panel data set and the estimation is performed separately for agriculture and for manufacturing. Table 3

[12] Higher transport costs and local supply suggests a lower price pass-through in rural areas, especially on agricultural products.

[13] From a time series of six cross section surveys (from 1989 to 2000), synthetic cohorts are defined as groups with fixed membership, whose individuals (or households) can be identified as they show up in the surveys. For this reason, groups are defined according to some time invariant variables. Means within each cohort are calculated and followed for each temporal unit under examination: this cohort aggregation is defined as a *pseudo panel*.

reports the results of the pass-through model which indicate a pass-through between the international price and the border price of about 26 percent for agriculture and 67 percent for manufacturing.

The negative sign on the interacted terms indicates that, as the distance from the US border increases, price pass-through coefficients decline, suggesting the possibility of missing markets. Moreover, changes in prices may be internalized by intermediaries or absorbed by trade costs. Therefore, retail prices in the states closer to the US market tend to better "feel" the effect of movement in the tariff. Conversely, southern states seem to be the least connected to the international markets. Another result is the difference between urban and rural areas. Urban areas in all regions "feel" the movement in the tariff to a larger extent, especially in the case of agricultural products. Finally, movement in the tariffs of agricultural products tends to be reflected to a lesser extent in domestic prices relative to manufacturing products (especially in rural areas). This is not surprising and is likely driven by a greater presence of domestic substitutes and stronger consumer preference for domestically produced varieties.

3.2. Production and Export supply

A successful Doha implementation is estimated to produce an increase in overall production of about 850 million USD per year, mostly driven by increases in international demand for Mexican products. It is important to note that an increase in demand for Mexico's exports will not necessarily have a substantial effect on poverty. The reason is twofold. First, poor households may not be directly employed in producing (and marketing) products for which there are increases in export demand. And second,

there is a cost associated with the increase in supply, with net gains likely to be much smaller than the change in production volume.

The increase in sales can be decomposed into the quantity effect (the actual value of the increase in production) and the price effect (the increase in value of this quantity due to the higher price). The base case simulation of the Doha scenario assumes that there are real costs associated with the increase in production required to meet increased agricultural demands in the wake of policy reform. Therefore, the net gains to households originate only from the increase in the prices, now applied to the increased production. A second assumption is required to allocate the increased in production to individual households. This is assumed to be proportional to the marketed production of households, and it is also assumed to follow the price-pass through mechanism – with weaker effects in the more remote rural areas. This implies that households which are producing only for auto-consumption will not be allowed to increase production and households that will not observe any price signals will not adjust their production to fill the increase in demand.

3.3. Labor Earnings

The link between trade reforms and labor earnings goes through the price mechanism. International trade reforms operate through changes in prices, and changes in prices will consequentially affect labor earnings. In estimating the impact on wages of Doha implementation, this paper makes the assumption that movements in wages are directly affected by movements in prices. A more sophisticated approach would require the estimation of price-wage elasticities for different products and different types of labor. However, this would require additional data and would make the analysis more cumbersome while adding little to the overall analysis. Moreover, labor markets in

developing countries are seldom integrated and empirical evidence suggests that returns to labor vary greatly across different geographic areas (Hanson, 1997 and 2003), calling for a model that allows wage response to vary across geographic areas. The GTAP model estimates an average change in wages (skilled and unskilled) across scenarios which falls between –0.2 and 0.1 percent. Given these small changes, and for the sake of simplicity, wages are assumed to follow the price pass-through mechanism on a regional level. Arguably, this is a reasonable assumption which implies that wages are assumed to move more in regions where price pass-through is greater relative to regions where price-pass through is smaller. As in the case of the prices of goods, the movement of the average wage is kept at the level estimated by the CGE model.

3.4. Changes in household welfare

Having illustrated the channels used to investigate the effect on households resulting from the implementation of Doha, it is now possible to calculate changes in household welfare.[14] In developing countries, most households are simultaneously consumers and producers of goods and services. Therefore, in analyzing the effect on household welfare from any policy it is important to recognize this dual role of the household.[15] The farm household model fits this purpose (Singh, Squire and Strauss, 1986). The approach used here to measure the change in real income (dy_h) can be expressed as follows:

[14] The change in household welfare is calculated by taking into account only first order effects.
[15] For details and applications see Deaton (1997).

$$dy_h = \underbrace{\sum_g \theta_h^g dP_h^g y_h}_{ag.\,income\,(price\,effect)} + \underbrace{\sum_g dQ_h^g dP_h^g}_{ag.\,income\,(production\,effect)} + \underbrace{\theta_h^\ell dw_h y_h}_{labor\,income} - \underbrace{\sum_g \phi_h^g dP_h^g y_h}_{consumption} \quad (2)$$

where, dP_h^g are the changes in prices of good *g* faced by households *h*; θ_h^g is the share of income obtained from the sale of good *g* by household *h*; θ_h^ℓ is the share of income obtained in the labor market; ϕ_h^g is the share of the consumption basket devoted to good *g*; y_h is the income of the household[16]; and

$$dQ_h^g = \Delta\text{Prod}^g \frac{y_h^g}{\sum_h y_h^g} \quad (3)$$

where ΔProd^g is the total change in the production of good *g*, and y_h^g is the income originating from the sale of good *g* by household *h*.[17]

In this setup, equation (2) suggests that a change in the price of good *g* favors or harms the household based on the "net exposure" of its budget to that particular good. Moreover, an increase in the international demand for a particular good favors households in proportion to their marketed production of the good, and movement in wages affects households relative to their share of wage income. Finally, the change in welfare is distributed across household members, expenditures are determined by the new level of income, and new welfare indicators are calculated at the new level of consumption.

[16] Income is equated to expenditures.
[17] Prices are different by region. The subscript *r* for region is omitted.

4. Simulation Results

The first scenario examined in this section looks at the effects of Doha and revolves around the status quo in which price transmission is kept at the estimated level and increases in farm output are costly. The second scenario builds on the first but mimics an improvement in the Mexican economy taking the assumption that any increase in agricultural production and exports is achieved at no additional cost to producers.[18] This could be due to an increase in productivity or it could be a consequence of the household utilizing surplus labor to achieve the increased production. The third scenario builds on the second and adds the assumption that domestic price transmission is improved by half.[19] Finally, a fourth scenario measures the results of full international trade liberalization on Mexican households, while still assuming the status quo in the domestic economy (no complementary reforms).

The change in real income is used as the welfare indicator for each scenario/household group. Results are differentiated by region, and presented for the following three household groupings: all households, all poor (those living below the asset poverty line) and very poor (those living below the food poverty line).

a) Doha Scenario

The results of the Doha implementation based in the absence of domestic reforms suggest these trade reforms would have a small negative impact on overall real income in Mexico. Table 4 reports the change in real income for the total population, the poor, and the very poor, further differentiated by region and urban and rural areas. The only

[18] This implies that the value of the increase in exports is directly transferred to the income of the household through agricultural production.
[19] That is, the coefficients in the interaction terms are divided by two.

exceptions to the negative impacts are the positive effects for the very poor in the northern and US border regions. However, the effects, both positive and negative are in all cases within 0.3 percent of change in real income.

b) Complementary Reform Scenario 1 (Doha plus)

The results of the Doha implementation in the presence of facilitating increases in productivity (or the utilization of surplus labor) are reported in Table 5. The results from this scenario, although small, show a positive effect from Doha implementation. On average, Doha is expected to raise real income in Mexico by about 0.4 percentage points. However, the poor, and in particular the very poor, gain substantially more, especially in the northern and border regions. Average gains are about 0.7 percent for the very poor and 0.5 percent for the poor as a whole. Urban areas are expected to gain less relative to rural areas due to the smaller share of agricultural production in total income in the broadly defined urban areas. However, the poor in the remote, Southern states still gain little from this trade reform.

c) Complementary Reform Scenario 2 (Doha plus-plus)

The results of the Doha implementation in the presence of both increases in productivity, as well as improved domestic price transmission, are reported in Table 6. The results show the role of domestic price transmission in distributing the effects of Doha implementation across income groups and regions. Improved domestic price transmission is expected to redistribute gains from the northern regions of the country to the south, and at the same time from non-poor to poor. This scenario estimates a change in the real income of the poor and very poor of 0.6 and 1.1 percent, which when compared to the Doha-plus scenario, translate into an additional in increase by 0.1 and 0.4 percent respectively. This reflects the fact that poor households are generally more remotely located and therefore experience fewer of the gains from increased trade opportunities due to incomplete markets. Overall, the gains from this scenario are more uniformly distributed across regions.

Based on the results from this Doha-plus-plus scenario, the change in real income at the household level is regressed on household characteristics so as to better investigate the variance of the gains. Clearly, these variables are not purely exogenous to the welfare gains; however, one should see this regression of descriptive interest so as to help isolate covariates of relevance. This information may prove useful when thinking about compensatory policies. Results of the regression are presented in Table 7 as well as a summary of descriptive statistics. The share of variance in gains that is accountable to those covariates is about 21 percent. The regression results give a rough indication of how the gains are distributed.[20] As seen previously in Table 5, the results suggest that

[20] The constant represents low education households in the Federal district of Mexico City in the first income decile.

urban areas gain relatively less from the Doha implementation. Moreover, ceteris paribus, the geographical distribution of gains suggests that northern regions and regions closer to the US border gain substantially more, while southern regions gain the least. The coefficients on household characteristics suggest that larger families gain less than smaller ones. Similarly, lower gains are estimated for female headed households as well as households where the household head is relatively less educated. Finally, the coefficients on the decile variables suggest that low income households obtain the largest gains in percentage terms.

d) Full trade liberalization

The results from a hypothetical multilateral full multilateral trade liberalization scenario are reported in Table 8. Full multilateral trade liberalization is expected to produce a negative impact for Mexican households. Losses are on the order of about one percent with peaks of about 4 percent for the very poor living in urban areas in the northern regions. The negative outcome of this scenario is the result of the increase in the prices of consumption goods for Mexican households and the reduction in exports driven by the sharp erosion of Mexican preferences in the US market.

e) Summary

The results that emerge from the four scenarios can be summarized as follows: a) Doha alone, without any complementary reform, is likely to have a negative, albeit very small, impact on Mexican households; b) Doha implementation with complementary reforms aimed at increasing productivity is expected to produce positive small gains for Mexican households; c) without improvement of domestic price transmission the effect of the Doha implementation are expected to be concentrated in the northern regions; d)

improvement in the domestic price transmission results in a more uniform distribution of the effects, and in a larger benefits for the poorest households.

Most importantly, the findings suggest that the variance of the gains largely depends on domestic price transmission. When price transmission is assumed to stay at the estimated level, households living in the southern regions (especially rural) are largely unaffected by Doha, either positively or negatively. This happens because price signals originating from the Doha-induced movement in world prices subsequent to trade reforms are perceived only marginally in those areas. When domestic price transmission is assumed to improve, the distribution of the gains is more uniform across geographic areas and households.

In summary what emerges from the analysis of the simulation exercise is that without complementary reforms Mexico is not expected to gain from Doha and is expected to lose in the case of full multilateral trade liberalization. This outcome is not surprising considering that Mexico has already liberalized trade with its most important trading partner, through its membership in NAFTA. So multilateral tariff reductions in the USA result in an erosion of those preferences currently enjoyed by Mexican exports.

5. Conclusions

This paper provides a quantitative estimate of the effect on Mexican households from the implementation of the Doha Development Agenda taking into account the role of domestic price transmission. The findings suggests that multilateral trade liberalization is likely not beneficial for most Mexican households unless it is complemented by domestic reforms aimed at facilitating the response of households to these new market opportunities.

The findings suggests that the poor would likely share in the benefits (and costs) of such trade reforms. The differences in impacts across households are more closely associated with geographic areas of residence rather than income level. The results point to the importance of domestic price transmission in determining the variance of the effects across households. Given the existing structure of markets in Mexico, most of the effects of multilateral trade policies would be felt in the northern states, which are more connected to international markets. Conversely, households living in the southern states are isolated from most effects, not because of the composition of their consumption or income bundle but because of the marginal effect of trade reforms on prices in those areas. Measures aimed at enhancing domestic price transmission could ensure that any gains from trade reform (when accompanied by productivity-enhancing policies) would be more evenly spread throughout the country.

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Figure 1 – Household Income

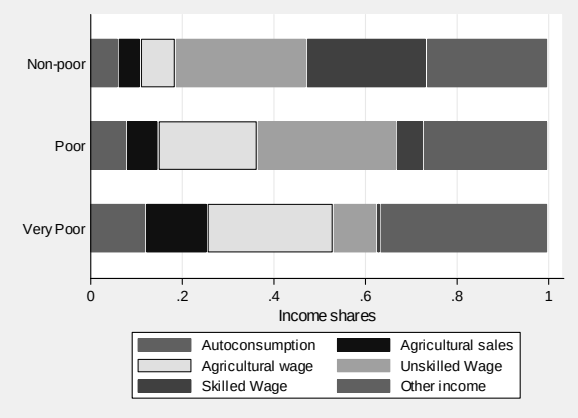
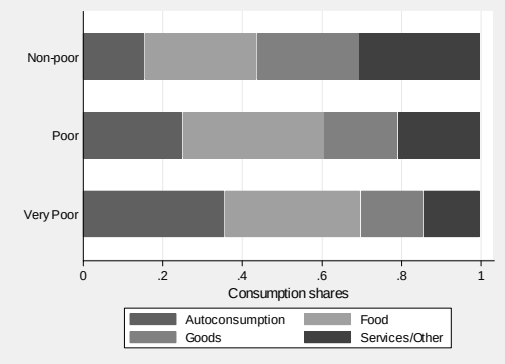


Figure 2a and 2b – Household Consumption



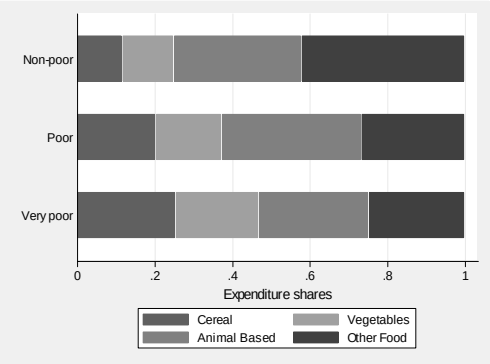


Table 1: Poverty in Mexico (headcount)

	Extreme Poverty			Moderate Poverty		
	Total	Urban	Rural	Total	Urban	Rural
Federal District	11.2	11.2		43.3	43.3	
US Border	15.9	7.5	32.9	51.2	35.4	67.6
North	23.1	16.1	43.2	52.8	41.4	73.3
Center	27.6	16.5	55.7	59.2	49.4	90.0
South	45.4	25.3	78.6	71.3	56.8	93.8
Total	24.2	13.7	58.5	53.7	43.7	83.8

Table 2: Scenarios – Doha implementations and Full Trade Liberalization

Sector	Change in factor returns			
	Doha		Full liberalization	
Return to Land	1.0%		-16.4%	
Unskilled Labor	-0.1%		-0.1%	
Skilled Labor	-0.2%		0.1%	
Capital	-0.2%		0.0%	
Natural Resources	1.6%		1.1%	
	Doha		Full liberalization	
Product Group	Price change (%)	Change in Production (million USD)	Price change (%)	Change in Production (million USD)
Cereals	0.4%	18.9	14.6%	-351.6
Dairy	0.2%	-35.6	-0.6%	-418.0
Meat products	0.2%	135.6	0.1%	-495.8
Oils and Fats	3.0%	12.3	15.2%	-57.9
Sugar	0.2%	-2.2	0.0%	-27.2
Vegetables	0.6%	11.9	-1.8%	80.7
Other Agricultural	0.5%	61.4	-1.9%	222.3
Food Products	0.0%	44.4	0.3%	-62.6
Household Items	0.0%	746.9	-0.6%	147.4
Textiles and Apparel	0.0%	-565.1	0.1%	-2,506.0
Other Manufacturing	0.0%	122.6	-0.3%	-1,760.9
Other products	0.3%	31.0	0.8%	81.4
Services	-0.1%	241.4	0.6%	361.3

Table 3 – Pass-through

Variable	Agriculture			Manufacturing		
International price	1.449	***	(0.165)	0.004		(0.007)
Regional cpi	0.284	*	(0.149)	1.174	***	(0.247)
Local supply	-0.036	***	(0.011)	-0.016		(0.017)
Urban /Rural	0.131	***	(0.043)	0.510	***	(0.064)
Distance	0.002		(0.012)	-0.030	*	(0.016)
Tariff pass-through	0.260	*	(0.155)	0.671	***	(0.101)
Urban transmission	0.003		(0.033)	-0.091	***	(0.034)
Rural transmission	-0.054	**	(0.027)	-0.108	***	(0.027)
Constant	9.498	***	(1.021)	5.201	***	(0.623)
Obs	378			378		
R-squared	0.58			0.64		

Note: All variables, except distance, are in log. White corrected standard errors are shown in brackets. Significance level of 1%, 5% and 10% are indicated by ***, ** and * respectively.

Table 4– Change in real income (Doha)

Region	Total	Urban	Rural	All poor	Urban Poor	Rural Poor	Very poor	Urban Vpoor	Rural Vpoor
Federal District	-0.1%	-0.1%		-0.1%	-0.1%		0.0%	0.0%	
Border	-0.3%	-0.3%	0.1%	-0.1%	-0.2%	0.1%	0.2%	0.1%	0.3%
North	-0.1%	-0.1%	0.1%	0.0%	-0.1%	0.1%	0.2%	0.3%	0.2%
Center	-0.1%	-0.2%	0.0%	-0.1%	-0.2%	0.0%	0.0%	-0.1%	0.0%
South	-0.1%	-0.2%	0.0%	-0.1%	-0.2%	0.0%	0.0%	-0.2%	0.0%
National	-0.1%	-0.2%	0.0%	-0.1%	-0.2%	0.0%	0.0%	-0.1%	0.0%

Table 5: Change in real income (Doha plus)

Region	Total	Urban	Rural	All poor	Urban Poor	Rural Poor	Very poor	Urban Vpoor	Rural Vpoor
Federal District	0.1%	0.1%		0.3%	0.3%		1.2%	1.4%	
Border	0.6%	0.4%	1.5%	1.0%	0.8%	1.6%	2.0%	1.8%	2.4%
North	0.9%	0.7%	1.2%	1.1%	0.9%	1.2%	1.8%	2.5%	1.5%
Center	0.3%	0.2%	0.5%	0.4%	0.3%	0.5%	0.6%	0.7%	0.6%
South	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	0.0%
National	0.4%	0.2%	0.6%	0.5%	0.4%	0.5%	0.7%	0.9%	0.6%

Table 6: Change in real income (Doha plus plus)

Region	Total	Urban	Rural	All poor	Urban Poor	Rural Poor	Very poor	Urban Vpoor	Rural Vpoor
Federal District	0.2%	0.2%		0.4%	0.4%		1.5%	1.4%	
Border	0.3%	0.2%	1.1%	0.7%	0.5%	1.1%	1.4%	1.1%	1.9%
North	0.7%	0.5%	1.1%	0.9%	0.7%	1.1%	1.4%	1.9%	1.3%
Center	0.5%	0.3%	0.9%	0.7%	0.4%	1.0%	1.1%	0.9%	1.2%
South	0.4%	0.2%	0.7%	0.5%	0.3%	0.7%	0.8%	0.6%	0.9%
National	0.4%	0.2%	0.9%	0.6%	0.4%	0.9%	1.1%	1.0%	1.1%

Table 7 - Improved scenario: variance of the gains

Regression Results (dependent variable: percentage gains)				Descriptive statistics.		
HH characteristics	Coefficient		s.e		Mean	St. dev.
Gender (1=female)	0.0001		(0.0004)	Gender (1=female)	0.18	0.39
Age	0.0001	***	(0.0000)	Age	46.31	15.38
Share child	0.0006	***	(0.0001)	Share child	1.49	1.50
Share elderly	0.0006	*	(0.0003)	Share elderly	0.30	0.60
Household Size	-0.0049	***	(0.0004)	Household Size	1.30	0.54
Urban Dummy	-0.0050	***	(0.0004)	Urban Dummy	0.77	binary
Region				Mexico City (dropped)	0.23	binary
Us Border	0.0015	***	(0.0004)	Us Border	0.16	binary
North	0.0031	***	(0.0005)	North	0.10	binary
Center	0.0010	***	(0.0004)	Center	0.39	binary
South	-0.0006		(0.0005)	South	0.13	binary
Education				No education (dropped)	0.15	binary
Primary	-0.0009	**	(0.0004)	Primary	0.43	binary
Middle	-0.0013	***	(0.0005)	Middle	0.20	binary
Secondary	-0.0024	***	(0.0006)	Secondary	0.21	binary
College	-0.0033	**	(0.0013)	College	0.01	binary
Income Deciles				Income Decile 1 (dropped)	0.10	binary
Income decile 2	-0.0022	***	(0.0006)	Income decile 2	0.10	binary
Income decile 3	-0.0037	***	(0.0006)	Income decile 3	0.10	binary
Income decile 4	-0.0032	***	(0.0006)	Income decile 4	0.10	binary
Income decile 5	-0.0037	***	(0.0007)	Income decile 5	0.10	binary
Income decile 6	-0.0037	***	(0.0007)	Income decile 6	0.10	binary
Income decile 7	-0.0034	***	(0.0007)	Income decile 7	0.10	binary
Income decile 8	-0.0026	***	(0.0007)	Income decile 8	0.10	binary
Income decile 9	-0.0023	***	(0.0007)	Income decile 9	0.10	binary
Income decile 10	-0.0042	***	(0.0008)	Income decile 10	0.10	binary
Constant	0.0125	***	(0.0010)			
Observations	10108					
R-squared	0.21					

Note: All variables, except distance, are in log. White corrected standard errors are shown in brackets.
Significance level of 1%, 5% and 10% are indicated by ***, ** and * respectively.

Table 8: Change in real income (Full trade liberalization)

Region	Total	Urban	Rural	All poor	Urban Poor	Rural Poor	Very poor	Urban Vpoor	Rural Vpoor
Federal District	-0.8%	-0.8%		-1.1%	-1.1%		-1.0%	-2.1%	
Border	-1.4%	-1.3%	-2.2%	-2.1%	-2.0%	-2.5%	-3.3%	-3.7%	-2.8%
North	-1.7%	-1.8%	-1.5%	-2.1%	-2.6%	-1.5%	-2.5%	-4.2%	-1.7%
Center	-0.9%	-1.2%	-0.2%	-1.1%	-1.9%	-0.2%	-0.9%	-2.5%	-0.2%
South	-0.7%	-1.2%	0.0%	-0.8%	-1.9%	0.0%	-0.5%	-2.5%	0.0%
National	-1.0%	-1.2%	-0.5%	-1.3%	-1.9%	-0.4%	-1.0%	-2.7%	-0.3%

Annex: Data

Most of the data utilized in this study come from a series of Encuesta de Ingresos y Gastos de los Hogares (ENIGH), collected by the Instituto Nacional de Estadistica Geografica e Informatica (INEGI), and conducted in the third quarters of 1989, 1992, 1994, 1996, 1998 and 2000. ENIGH is a rich household survey built for the purpose of measuring the consumption and earnings of Mexican households. Even if the size of the ENIGH has varied from year to year, and its questionnaire updated from survey to survey, the conceptual framework remains the same. This ensures that ENIGH's results are comparable across years. The survey is stratified according to urban and rural location. The sampling is done to assure that households are representative of geographic clusters with probability of being included proportional to cluster size. Most of the analyses (specifically the welfare calculations) are based on the 2000 survey, which has a sample of about 10,000 households.

Trade data was obtained by the UN COMTRADE database. Tariff data was obtained from the TRAINS UNCTAD database. Further data comes from other national account statistics and from the World Bank WDI database.

A key input in the paper is represented by the price changes estimated by the GTAP model. The GTAP model (Hertel, 1997) is a standard multi-region applied general equilibrium model. It has perfectly competitive markets, constant returns to scale technology, and a supply-side that emphasizes the role of inter-sectoral factor mobility in the determination of sectoral output. Product differentiation between imports and domestic goods, and among imports by region of origin, allows for two-way trade in each product category, depending upon the ease of substitution between products from

different regions. The GTAP model estimated for this paper was explicitly run to assess the impact on average domestic prices in Mexico. The model produced estimates in changes in prices and export quantities for 13 product groups (4 manufacturing group, 8 agricultural group and 1 service group). The model also produces changes in returns for land, two types of labor, capital and natural resources. These product groups are matched to the household survey.

In matching and reconciliation the data from the household surveys with the GTAP data this paper follows the approach of Ianchovicina, Nicita and Soloaga (2001). In summary, the matching of the household survey classification to GTAP categories consists of two different exercises: consumption matching and income matching. On the expenditure side, the GTAP system has approximately 50 commodity categories, while the household data includes about 600 different categories. The matching of the expenditure side of the two data sets was facilitated by the use of concordance tables provided by the GTAP website (www.gtap.org). Regarding income, GTAP uses five different endowment categories, while in the household survey data there are more than 40. In addition, the two data sets adopt different systems in classifying income.

Therefore, they are more difficult to match and require some degree of arbitrariness. GTAP income is divided into land, capital, skilled labor, unskilled labor and natural resources. The attained level of education is the variable that allow us to distinguish between skilled and unskilled labor. An individual is considered skilled having completed secondary school or technical education. The household survey divides income into different categories, some of which are not univocally or clearly attributable to any single GTAP category. Many of those household income categories must be

attributed to two or more GTAP categories. To calculate the correct sharing coefficients, input output tables of GTAP are used. In the household data, there are various categories that cannot be matched with those of GTAP. These consist mainly of transfers and negative savings, whose average income flow are assumed not to vary with the simulation. Another issue is that income is usually underreported in the household surveys, and total expenditures usually exceed total income. This factor, together with consumption smoothing issues prompted me to use total expenditure as a proxy for total income. Nevertheless, the income structure of the household data is still maintained. It is likely that different income categories have different degrees of underreporting. A final issue is that the income composition of the survey data is very different from the share of GTAP income categories. Because of the misreporting issues mentioned above, I relied on the GTAP endowment structure, nevertheless still maintaining the distribution of the endowments across households.